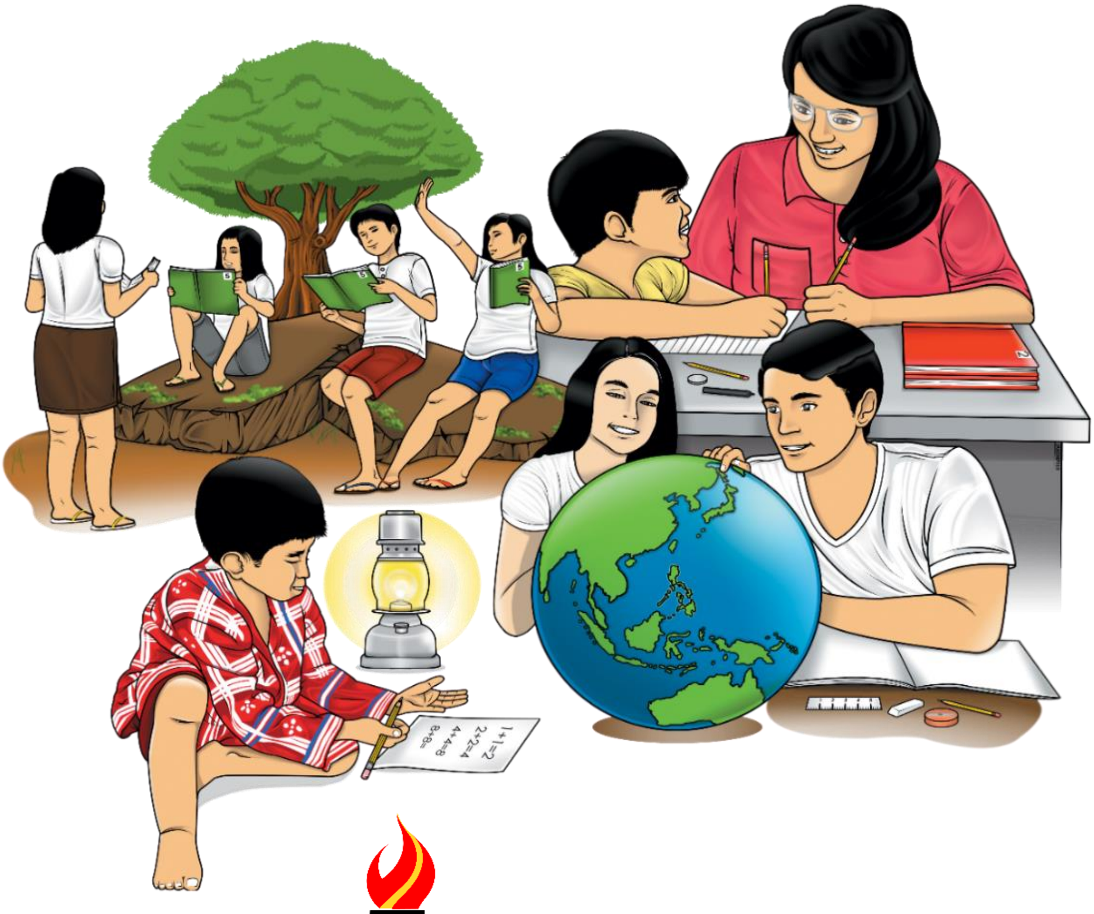
8

Mathematics

Quarter 3 – Module 1

Describing Mathematical System



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Quarter 3 – Module 1 Describing Mathematical System
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8

Mathematics

Quarter 3 – Module 1

Describing Mathematical System

DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

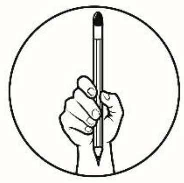
This module was crafted to help you understand the skills of describing the mathematical system. Varied activities were designed and aligned based on the different skills needed to process the knowledge and skills learned and to apply it in real – life setting. The scope of this module permits you to use it in many different learning situations. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module contains:

Lesson 1 – Describing Mathematical System

After going through this module, you are expected to:

1. describe mathematical system and its components;
2. determine axioms for real numbers;
3. prove statements about real numbers using two – column form; and
4. apply mathematical system in real – life setting.



What I Know

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. What do you call the statements that are assumed to be true and do not need proof?
   A. axioms
   B. defined terms
   C. theorems
   D. undefined terms

2. Which of the following is the multiplicative inverse of $2x/3$?
   A. $2x/3$
   B. $3/2x$
   C. $-3/2x$
   D. $-2x/3$

3. Which statement is true?
   A. $3/4$ is an integer.
   B. -5 is a natural number.
   C. Integers are rational numbers.
   D. Rational numbers are also irrational numbers.

4. What axiom is illustrated in the statement, If $A = B$, $B = C$, then $A = C$?
   A. multiplication
   B. reflexive
   C. symmetric
   D. transitive

5. Which of the following illustrates symmetric property?
   A. If $a = b$, then $b = a$.
   B. If $a = b$, then $ac = bc$
   C. If $a = b$, then $a + c = b + c$.
   D. If $a = b$ and $b = c$, then $a = c$.

6. Using the distributive property, $5\,(x + y) =$ ____.
   A. $5x + y$
   B. $y + 5x$
   C. $5x + 5y$
   D. $5 + x + y$

7. Name the property which justifies the following conclusion.
   Given: If $2x + 3 = 10$
   Conclusion: then $2x = 7$
   A. Addition property of equality
   B. Multiplication property of equality
   C. Reflexive property
   D. Transitive property

8. There are four parts of the Mathematical system. Which of the following is not a part of the mathematical system?
   A. corollary
   B. theorems
   C. axioms or postulate
   D. defined and undefined terms

9. Which of the following statements is true about axioms or postulates?
   A. These are concepts that need to be defined.
   B. These are statements accepted after it is proved deductively.
   C. These are concepts that can be defined using the undefined terms.
   D. These are statements assumed to be true and need no further proof.

10. Which of the following statements is true about a postulate?
   A. It is never accepted to be true.
   B. It is accepted as true without a formal proof.
   C. It is only accepted as true after being formally proven.
   D. It is usually not obvious as true, so it must be proven.

11. Which of the following best describes a theorem?
   A. It is the same thing as a postulate.
   B. It is a statement that is accepted as true without a formal proof.
   C. It is a statement that is impossible to be proven by mathematical reasoning.
   D. It is a statement that has been formally proven using mathematical reasoning.

12. Which of the following illustrates a commutative axiom?
   A. $(3 + n) + 5 = 3 + (n + 5)$
   B. $a(7 + b) = (a)(7) + (a)(b)$
   C. $4 + n = n + 4$
   D. $9 + (-9) = 0$

13. Which of the following correctly illustrates associative property?
   A. $(AB + BC) + CD = (BC + AB) + CD$
   B. $(AB + BC) + CD = CD + (AB + BC)$
   C. $(AB + BC) + CD = AB + (BC + CD)$
   D. $(AB + BC) + CD = (AB + BC) + CD$

14. Suppose you are standing in a room with a group of people, and by sight, you see one of them is the tallest. Which of the following best describes the statement that the person is the tallest among others?
   A. The statement that is always false.
   B. The statement cannot be proven to be true or false.
   C. The statement needs to be formally proven to be accepted as true.
   D. The statement doesn't need to be formally proven to be accepted as true.

15. In finding the value of x in $4(3x - 5) = 16$, which of the following is the correct step by step process?
   a. $3x - 5 + 5 = 4 + 5$ by addition property of equality
   b. $3x = 9$ by additive inverse and additive identity
   c. $\frac{4(3x-5)}{4} = \frac{16}{4}$ by multiplication property of equality
   d. $3x - 5 = 4$ by additive inverse
   e. $3x/3 = 9/3$ by multiplication property of equality
   f. $x = 3$ by simplification

   A. a, b, c, d, e, f
   B. a, c, b, e, d, f
   C. c, d, a, b, e, f
   D. c, d, b, a, e, f

Lesson 1	Describing Mathematical System

Have you encountered terms that are not clear or undefined? Why do you think it is necessary to define terms? Why do we need to be precise and concise in what we say or write? Are there times that you believe on statements even without proof? Are there times that you need to prove to someone that your statement is true?

In this module, you will be learning about Geometry as a Mathematical System and its parts. The concepts and skills that you learn from this module will be helpful when you want to logically derive a certain result.

What's In

In your previous lesson, you learned how to write direct and indirect proof. Let us begin this module by doing the activity below.

Activity: Prove Me True

Directions: Prove that if $a = b$, and $c = d$, then $a + c = b + d$. Complete the table below

by filling in the statements or reasons. Answer the questions that follow.

Proof:

Statement	Reason
1.$a = b$	____________________
2.__________	Add both sides by c
3.$c = d$	____________________
4.__________	Add both sides by b
5. $a + c = b + d$	

Questions:

1. How did you find the activity? Were you able to supply the accurate statement or reason?
2. Was the proof used direct or indirect? Justify your answer.

What's New

Activity: Match Me!

What branch of Mathematics deals with measurement, properties, and relationship of points, lines, angles, surfaces and solids?

Directions: Match column A to column B to answer the question above. Write the letter of the correct answer in the box corresponding to the number. Write your answer on a separate sheet of paper.

Column A	**Column B**
1. Commutative	O. If $a = b$, then $b = a$
2. Associative	M. $(a + b) + c = a + (b + c)$
3. Reflexive Axiom	E. $a + b = b + a$; $ab = ba$
4. Symmetric Axiom	G. $a\left(\frac{1}{a}\right) = 1$ and $\frac{1}{a}(a) = 1$ for $a \neq 0$
5. Multiplicative Inverse	T. If $a = b$ and $b = c$, then $a = c$
6. Addition Axiom	R. If $a = b$, then $a + c = b + c$
7. Transitive Axiom	Y. $a = a$

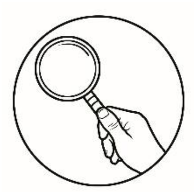
Your Answer:

5	1	4	2	1	7	6	3

Questions:

1. How did you feel about the activity?
2. Were you able to form the word correctly to answer the question above? If not, why?
3. Were you able to encounter these axioms in Grade 7?

In this lesson, you will be able to learn what axioms are and use the different axioms on real numbers in proving mathematical



What is It

Geometry has a big contribution in our society. It is the beginning of numerous easy and complicated designs of buildings, infrastructures, houses, churches, and many others. This implies that we apply to the modern world what Euclidian theories in Geometry have been given. Euclid of Alexandria (lived c. 300 BCE) was known as the "Father of Geometry". He systematized ancient Greek and Near Eastern mathematics and geometry. The **mathematical system** known as Euclidian Geometry attributed to Euclid, was described in his textbook the "*Elements"* as a structure formed from one or more sets of undefined objects, various concepts which may or may not be defined, and a set of axioms relating these objects and concepts.

To have a better understanding regarding the parts of mathematical system let us discuss them one by one.

Undefined terms are terms that do not require a definition but can be described. These terms are used as a base to define other terms, hence, these are the building blocks of other mathematical terms, such as definitions, axioms, and theorems. Examples of undefined terms are point, line and plane.

Defined Terms are the terms of mathematical system that can be defined using undefined terms. Examples of defined terms are *angle*, *line segment*, and *circle*. Term or phrase which makes use of the undefined terms and previously defined terms and common words.

Is it possible to know the meaning of the word without actually defining it? If it is, how can we do it?

We can define the term by describing some of its characteristics.
Example:
What is a real number?

We know that a real number is an undefined term but we can define it by describing its characteristics. That is, *for any real number x, we say that x is a number that can be found on the number line and may be rational or irrational.* The definition is necessary to successfully support the statement of a proof.

Axioms and Postulates are the statements assumed to be true and no need for further proof. Consider the statements:

1. The sun sets in the west.
2. The Philippines is found in Asia.
3. There are 7 days in a week.

Do these statements need proof before we accept them to be true?

These are observed facts and are already accepted as true even without proof. These are examples of axioms. Furthermore, **postulates** are assumptions specific to Geometry while **axioms** are generally statements used throughout mathematics. **Postulates or axioms** are statements that may be used to justify the statements in a proof. The axioms often used in Algebra and Geometry are the Axioms for Real Numbers which are found at the table below.

Let $a, b,$ and c denote any real numbers, and in symbol: ($a, b, and\ c \in R$)	
Axioms	**Description**
Commutative Axiom	$a + b = b + a$ or $a \cdot b = b \cdot a$
Associative Axiom	$a + (b + c) = (a + b) + c$ or $a \cdot (b \cdot c) = (a \cdot b) \cdot c$
Distributive Axiom	$a \cdot (b + c) = (a \cdot b) + (a \cdot c)$
Reflexive Axiom	$a = a$
Symmetric Axiom	$If\ a = b,\ then\ b = a$
Transitive Axiom	$If\ a < b,\ and\ b < c,\ then\ a < c$
Addition Axiom	$If\ a = b,\ then\ a + c = b + c$
Multiplication Axiom	$If\ a = b,\ then\ a \cdot c = b \cdot c$
Existence of Additive Inverse	$a + (-a) = (-a) + a = 0$
Existence of Multiplicative Inverse	$a \cdot a^{-1} = a^{-1} \cdot a = 1$ for $a \neq 0$
Existence of Additive Identity	$For\ any\ real\ number\ a,\ a + 0 = 0 + a = a$
Existence of Multiplicative Identity	$For\ any\ real\ number\ a,\ a \cdot 1 = 1 \cdot a = a$
Trichotomy Axiom	$a < b$ or $a = b$ or $b < a$

- **Theorems** are statements accepted after they are proven true deductively. The axiomatic structure of a mathematical system follows a sequence, starting with a set of undefined terms which are bases to define terms, then axioms that are clearly stated, and from these a theorem is derived through reasoning. Theorems are derived from the set of axioms in an axiomatic mathematical system. Below is the flow on how to arrive to the theorems.

Undefined terms and defined terms → Axioms → Theorems

Consider this statement, let $x, y,$ and z as real numbers, and $x > y$, then $x + z > y + z$. Can this statement be accepted without proof? This type of statement needs to be proven before it is accepted.

Consider the illustrative examples below.

1. Given: x, y, and z are real numbers and $x > y$
   Prove: $x + z > y + z$

   Proof:

Statement	Reason
1. $x > y$ 2. $x + z > y + z$	1. Given 2. Addition axiom

2. Given: $-4 = m$
   Prove: $m = -4$.

   Proof:

Statement	Reason
1. $-4 = m$	1. Given
2. $-4 + 4 = m + 4$	2. Addition axiom
3. $0 = m + 4$	3. From statement 2 existence of additive inverse
4. $0 - m = m + 4 - m$	4. Addition axiom (add -m to both sides)
5. $-m = 0 + 4$	5. Existence of additive inverse and additive identity
6. $-m = 4$	6. Existence of additive identity
7. $(-1)(-m) = 4(-1)$	7. Multiply both sides by -1
8. $m = -4$	8. Multiplication axiom

3. Given: $4(2x - 3) + 16 = 5x + 37$
   Prove: $x = 11$.

   Proof:

Statement	Reason
1. $4(2x - 3) + 16 = 5x + 37$	1. Given
2. $8x - 12 + 16 = 5x + 37$	2. Distributive axiom
3. $8x + 4 = 5x + 37$	3. Combine like terms
4. $3x + 4 = 37$	4. Existence of additive inverse
5. $3x = 33$	5. Existence of additive inverse
6. $\frac{1}{3}(3x) = (33)\frac{1}{3}$	6. Existence of Multiplicative Inverse
7. $x = 11$	7. Simplify

Oftentimes, we failed to recognize that we are dealing with the mathematical system in our lives. Here are some examples that show how it is applied in a real-life setting:

1. When I buy 2 pieces of shirt for $Php\,250$, 1 piece of pants for $Php\,500$ and a pair of shoes for $Php\,1000$, how much money will I need to pay to the cashier? I have in my mind that I may add first the amount for shirt and pants, then the total will be added to the amount for the pair of shoes or add first the amount for shoes and pants then the sum will be added to the amount of shirt. The result is just the same. This illustrates associative axiom.

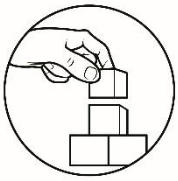
2. Justin and Allan wanted to buy a gift for their mother during her birthday. Justin has $Php\,150$ savings and Allan has $Php\,80$. If they double the amount, it would already be enough for the gift they planned to buy. How much money would they need to have altogether for them to be able to buy a gift for their mother?

$$2(150 + 80) = 2(150) + 2(80) = 300 + 160 = 460$$

   If we add their savings altogether and multiply by 2, notice that the answer is the same. This illustrates the Distributive Axiom.

3. Ivy and Mary wanted to have the same number of notebooks this coming school opening. Their mother bought them 5 pieces each. They wanted to have three more enough for the eight subjects. How many notebooks will their mother buy so that they would still have the same number of notebooks? Show the step by step process using the two-column form.

Statement	Reason
Both Ivy and Mary have 5 notebooks. Ivy = 5 , Mary = 5	Given
(Ivy) 5 + 3 = (Mary) 5 + 3 8 = 8	Addition Axiom



What's More

Activity 1: Figure it Out

Directions: Determine the axiom that justifies each of the following statements. Write your answer on a separate sheet of paper.

1. $2(-a + 5) = (2)(-a) + (2)(5)$
2. $\frac{2}{5} \cdot 1 = \frac{2}{5}$
3. $(x + 5) + 2 = x + (5 + 2)$
4. $\frac{1}{4} \cdot 4x = x$
5. $(x + y) + z = z + (x + y)$

Activity 2: Fill Me Out

Directions: Prove each statement by supplying reasons in the two-column form below. Write your answer on a separate sheet of paper.

1. Given: $\boldsymbol{7b - 25 = 2b}$

   Prove: $\boldsymbol{b = 5}$.

Proof:

Statement	**Reason**
1. $7b - 25 = 2b$	1. Given
2. $7b - 2b - 25 = 2b - 2b$	2.
3. $5b - 25 = 0$	3.
4. $5b - 25 + 25 = 0 + 25$	4.
5. $5b = 25$	5.
6. $b = 5$	6.

Activity 3: Solve Me

Directions: Solve the given problem below. Write your answer on a separate sheet of paper. Maria is solving $\frac{1}{x} = \frac{1}{2-3x}$. Her next step is $2 - 3x = x$. Solve for x and state the axioms that justifies it. Use two – column form.

What I Have Learned

After going through with this module, it is now time to check what you have learned from the activities. Read carefully and answer the items that follow.

A. Directions: Fill in the blank using the correct terms inside the box below.

Undefined terms	**defined terms**
axioms	**postulates**
theorems	

Mathematical System

1.____ are terms that do not have concrete definition but can be described. On the other hand, 2.________ require definition. There are statements assumed to be true even without proof which we called as axioms or postulates. However, the two has distinction in such a way that 3._____ are often used in Geometry while the 4. _____ are used in all areas of Mathematics. When the statement shows evidences or proven to be true, we call it as 5._____.

B. Directions: Tell whether each of the following statements is true or false. Write TRUE if the statement is correct and FALSE if it is not. Use a separate sheet of paper for your answer.

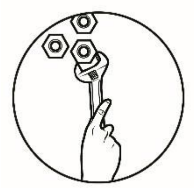
______1. By commutative axiom, $4 + n = n + 4$.

______2. $(3 + a) + 2 = 3 + (a + 2)$ is a distributive axiom.

______3. The additive inverse a is $-a$.

______4. The multiplicative inverse of -5 is $\frac{1}{5}$.

______5. If $x < y$, and $y < z$, then $x < z$ by symmetric axiom.



What I Can Do

It is now time to apply the concept you have learned in Describing the Mathematical system. Read the situation below and answer the questions that follow.

A sari – sari store owner bought five different brands of detergent powder namely A, B, C, D, and E. He bought 20 pieces for each brand. Even at a glance, he can easily state which brand of detergent powder is the best seller. Now, each powder claims that it would not irritate the skin after using it. In this case, the store owner wants to test each brand to prove if the claim is true.

Questions:

1. What represents or describes the undefined terms in the situation?
2. What statement represents an axiom? Why?
3. What statement represents a theorem? Justify your answer.
4. Suppose a variant will cost $2x - 5 = -x + 10$ pesos, prove that each will cost $Php5.00$. Use two – column form.
5. Suppose A, B, C, D, and E represent the number of packs of detergent sold for each brand, how much will the sari – sari store owner earn in total if the cost is $5(A + B + C + D + E)$ pesos? Use two – column form.

Assessment

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. What do you call the statements that can only be described and not defined?
   A. axioms
   B. defined terms
   C. theorems
   D. undefined terms

2. Which of the following is a commutative axiom?
   A. $2 + 3 = 2 + 3$
   B. $2 + 3 = 3 + 2$
   C. $2 \cdot 3 = 2 \cdot 3$
   D. $(2 + 3) = 2(3) + 3(2)$

3. Which statement is NOT true?
   A. Integers are rational numbers.
   B. Rational numbers are also irrational.
   C. All counting numbers are real numbers.
   D. Numbers from zero to ten are natural numbers.

4. What is the additive inverse of a = 0?
   A. 0
   B. $\frac{1}{a}$
   C. $-a$
   D. $-\frac{1}{a}$

5. Which of the following illustrates Multiplicative axiom?
   A. if $a = b$, then $b = a$
   B. if $a = b$, then $a + c = b + c$
   C. if $a = b$ and $b = c$, then $a = c$
   D. if $a = b$, then, $a \cdot c = b \cdot c$

6. Which of the following DO NOT imply associative axiom?
   A. $11 \cdot \frac{5}{6} = \frac{5}{6} \cdot 11$
   B. $[(-2)(6)]\,8 = -2\,[(6)(8)]$
   C. $(-5 + 7) + 4 = -5 + (7 + 4)$
   D. $A \cdot (B \cdot C) = (A \cdot C) \cdot B$

7. Name the property which justifies the following conclusion.

   Given: If $5x - 5 = 10$
   Conclusion: then $5x = 15$

   A. Existence of Additive Inverse.
   B. Existence of Multiplicative Inverse.
   C. Existence of Multiplicative Identity.
   D. Existence of Additive Inverse and Additive Identity.

8. Which of the following is NOT a property of Mathematical system?

A. conjecture | C. postulates
B. define terms | D. theorems

9. Which of the following statements is true about defined terms?

A. These are concepts that need to be defined.
B. These are statements accepted after it is proved deductively.
C. These are concepts that can be defined using the undefined terms.
D. These are statements assumed to be true and need no further proof.

10. Which of the following statements describes an axiom?

A. A statement that is never accepted to be true.
B. A statement that is accepted as true without a formal proof.
C. A statement that is only accepted as true after being formally proven.
D. A statement that is usually not obvious as true, using other rules and reasoning.

11. Which of the following illustrates distributive property of equality?

A. $3 + 4 = 4(3) + 3(4)$
B. $5(2) + 6(7) = 5(7) + 6(2)$
C. $8(x + y + z) = 8x + 8y + 8z$
D. $-8(x + y + z) = -8x + z + y$

12. Which of the following statements describes a theorem?

A. A theorem is the same thing as a postulate.
B. A statement that is accepted as true without a formal proof.
C. A statement that is impossible to prove using mathematical reasoning.
D. A statement that is proven true using postulates, rules and other theorems.

13. Which of the following illustrates reflexive property?

A. $(AB + BC) + CD = (AB + BC) + CD$
B. $(AB + BC) + CD = (BC + AB) + CD$
C. $(AB + BC) + CD = AB + BC + CD$
D. $(AB + BC) + CD = CD + (AB + BC)$

14. In finding the value of x in $5(2x - 4) = 20$, which of the following is the correct step by step process?

A. $2x - 4 + 4 = 4 + 4$ by addition property of equality
B. $2x = 8$ by additive inverse and additive identity
C. $\frac{5(2x-4)}{5} = \frac{20}{5}$ by multiplicative inverse
D. $2x - 4 = 4$ by additive inverse
E. $\frac{2x}{2} = \frac{8}{2}$ by multiplicative inverse
F. $x = 4$ by simplification

A. A, B, C, D, E, F | C. C, D, B, A, E, F
B. A, C, B, E, D, F | D. C, D, A, B, E, F

15. Baguio City is the summer capital of the Philippines. Which of the following best describes the statement?

A. The statement is obviously false.
B. The statement cannot be proven to be true or false.
C. The statement needs to be formally proven to be accepted as true.
D. The statement does not need to be formally proven and is accepted as true.

Additional Activities

A. Complete Me

Directions: Find the value of x and show a proof in a step by step process using two – column form.

Given: $\mathbf{5x - 10 = 3x - 2}$

Proof:

Statement	Reason
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

Answer Key

What I Know

1. A
2. B
3. C
4. D
5. B
6. C
7. A

A B

9. A
10. B
11. D
12. C
13. C
14. D
15. C

What's In

Activity: Prove Me True

Statement	Reason
1. a = b	1. **Given**
2**. a + c = b + c**	2. Add both side by c
3. c = d	3. Given
4. c + b = b + d	4. Add both sides by b
a + c = b + d	5. Addition Property of Equality

Answers:

1. Answers may vary; yes
2. By means of filling out the statements and reason, and solving it, also it is direct proof because no need for further proving.

What's New

Answer: GEOMETRY

G	E	O	M	E	T	R	Y
5	1	4	2	1	7	6	3

1. Answers may vary
2. Answers may vary
3. Yes

What's More

Activity 1: Figure it Out

1. Distributive Axiom
2. Existence of Multiplicative Identity Axiom
3. Associative Axiom
4. Existence of Multiplicative Inverse
5. Commutative Axiom

Activity 2: Fill Me Out

1. Given
2. Adding –2b to both sides
3. Existence of Additive Inverse
4. Adding 25 to both sides
5. Existence of Additive Inverse and Additive Identity
6. Existence of Multiplicative Inverse

Activity 3: Solve Me

statement	Reason
1. 1/x = 1/(2-3x)	1. Given
2. 2 - 3x = x	2. Existence of multiplicative inverse
3. 2 - 4x = 0	3. Existence of additive inverse
4. -4x = -2	4. . Existence of additive inverse
5. (-1/4)(-4x) = (-2)(-1/4)	5. Existence of multiplicative inverse
6. x = 1/2	6. Simplify

What I Have Learned

A. Fill in the blank

1. Undefined terms
2. Defined terms
3. Postulates
4. Axioms
5. Theorems

B. True or False

1. TRUE
2. FALSE
3. TRUE
4. FALSE
5. False

Assessment

1. D
2. B
3. B
4. C
5. D
6. A
7. D
8. A
9. C
10. B
11. C
12. D
13. A
14. D
15. D

What I Can Do

Answers:

1. The undefined terms that represent in the situations is “detergent powder”.
2. Even for a glance, he can easily state which of the detergent powders is the best – seller. This statement is a postulate because no need for further proof.
3. Now, each powder claims that it won’t irritate the skin after using it. In this case, each powder needs to be tested before it can be declared that the claim is true. This statement that needs to be formally proven to be accepted as true is what we call a theorem.

4. Given: $2x – 5 = -x + 10$
   Prove: $x = 5$ pesos

   Proof:

Statement	Reason
1. $2x – 5 = -x + 10$	1. Given
2. $2x + x – 5 = -x + x + 10$	2. Addition axiom (add – x to both sides)
3. $3x – 5 = 10$	3. Existence of additive inverse
4. $3x – 5 + 5 = 10 + 5$	4. Addition axiom (add 5 to both sides)
5. $3x = 15$	5. Existence of multiplicative inverse and additive identity
6. $X = 5$	6. simplify: 5 pesos each

5. Proof:

Statement	Reason
1. 5(A + B +C +D + E)	1. Given
2. 5A + 5B + 5C + 5D + 5E	2. Distributive axiom
3. 5(20) + 5(20) + 5(20) + 5(20) + 5(20)	3. Substitution method or substitute
4. 100 + 100 + 100 + 100 + 100	4. Addition axiom
5. 500	5. Simplify: total earned by the store owner

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